AVENUE

Avenue™ signal integration system

Model 5450 Digital Video Frame Synchronizer Data Pack

ENSEMBLE DESIGNS

Revision 2.1 SW v1.0

This data pack provides detailed installation, configuration and operation information for the **5450 Digital Video Frame Synchronizer** as part of the Avenue Signal Integration System.

The module information in this data pack is organized into the following sections:

- Module Overview
- Applications
- Installation
- Cabling
- Module Configuration and Control
  - Front Panel Controls and Indicators
  - Avenue PC Remote Control
  - Avenue Touch Screen Remote Control
- Troubleshooting
- Software Updating
- Warranty and Factory Service
- Specifications

MODULE OVERVIEW

The 5450 Digital Video Frame Synchronizer accepts a serial digital signal for frame synchronization and timing with full 10-bit processing. Four serial outputs, one active loop-through and two composite monitors outputs are provided, in addition to a reference input.

The serial input can be non-synchronous, making the 5450 ideal for incoming satellite feeds, studio signals and for timing sources into a router or switcher. The serial output timing signal can be set anywhere within one frame of the selected input reference, which can be the module's external BNC reference or the frame's master timing reference.

A composite monitor output is provided through two identical BNCs on the rear of the 5450 module to allow for signal monitoring.

Upon loss of signal or detection of TRS or EDH errors, the 5450 can be set for an interpolated field freeze or blanking to black until the signal is recovered. Internal black and color bar generators are present on the module. In freeze mode, audio can be muted or passed as desired. Additionally, a field or frame freeze can be triggered manually or with GPIs.

As illustrated in the block diagram on the following page, the serial input to the module enters a receiver circuit where cable equalization is processed and reported. The signal then moves through a reclocking and EDH detection circuit where the serial steam is deserialized, descrambled and EDH monitor detection is performed.

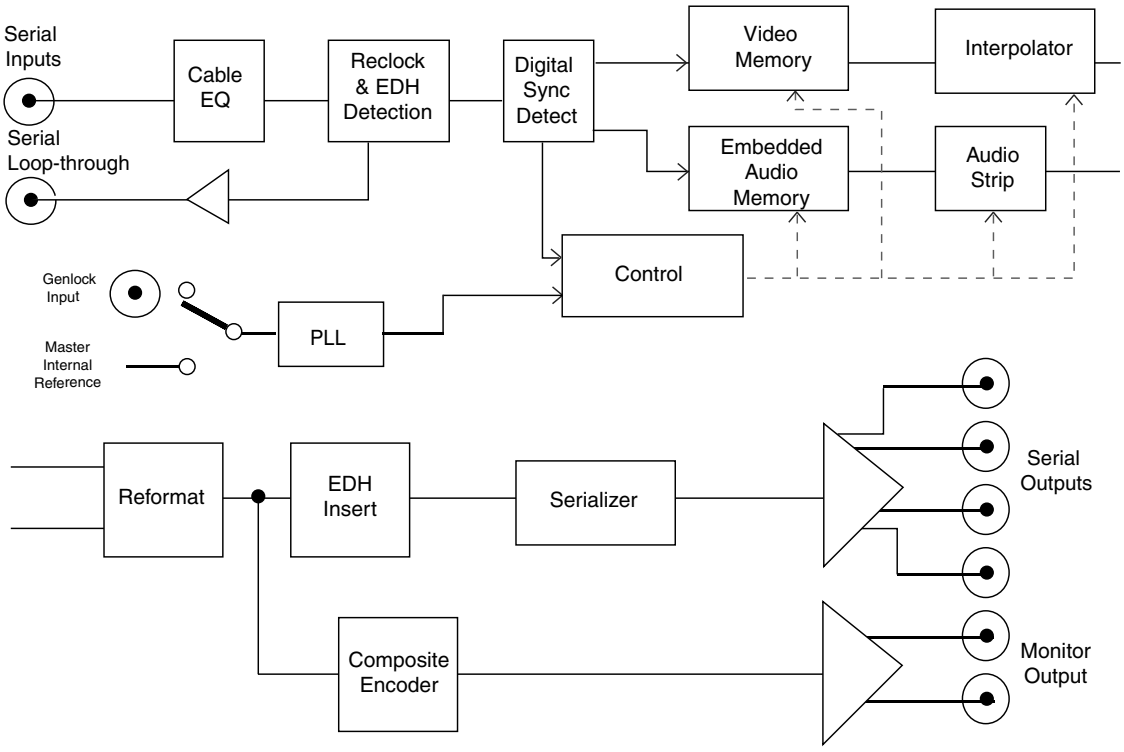
The serial output is sent through cable drivers to the reclocked Serial Out BNC. The 10-bit data stream passes through frame synchronizer memory circuitry where it can be delayed to one frame. Memory control in this section detects TRS and/or EDH errors and uses them to determine if an automatic freeze should be performed.

The output from the Frame Synchronizer circuitry is then passed to timing and interpolation circuitry which generates output timing and detects presence of audio ancillary data. This section also generates the internal black and color bars signals which can be inserted in the data stream upon loss of signal if desired.

This data stream is then sent to a serial encoder and serializer and EDH is inserted and updated before going to the four serial output BNCs. The same output is also sent to the composite encoder where the data stream is converted to composite for viewing on the monitor outputs.

Power is derived from the ± 12 volt frame power. It is regulated to +5 volts for the module by on-board regulator. The module is fused with a resettable fuse device. If the fuse opens due to an overcurrent condition, the module will lose power. After pulling the module, the fuse will reset automatically requiring no replacement fuse.

Module configuration can be set remotely or locally. The status can be read from the remote interfaces (Avenue PC or a Touch Screen) or from the LEDs on the front of the module as explained later in this data pack.



5450 Digital Video Frame Synchronizer Block Diagram

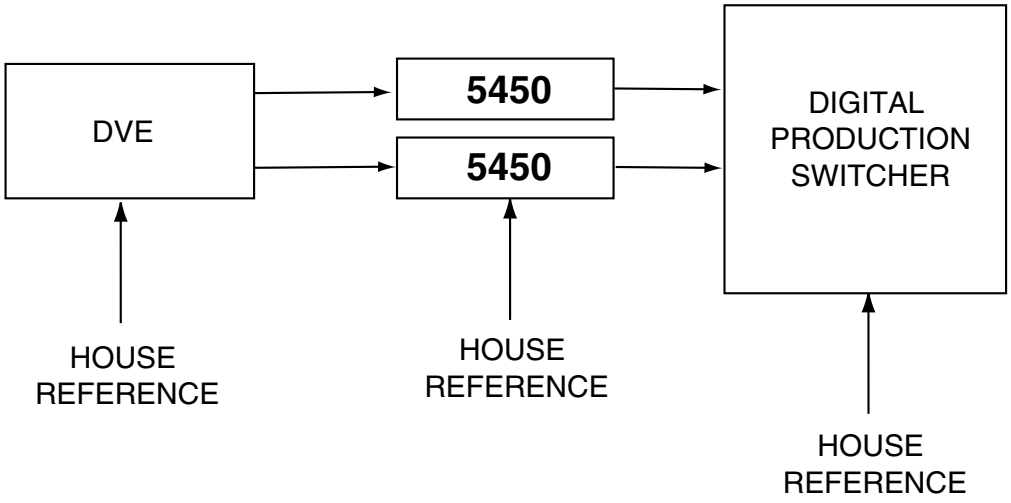
APPLICATIONS

The 5450 Digital Video Frame Synchronizer is ideal for applications where serial (601) inputs to a device such as a router or switcher require retiming. Serial signal sources such as satellite feeds, studio signals and timing sources that are not synchronous or are out of time with the facility can be brought into time and made useful for destinations that have limited input timing capability or auto-timing windows.

The application below shows the output of a DVE device being retimed in the 5450 to meet the auto-timing window requirements of a digital production switcher.

The 5450 can also be set to freeze the serial data stream or insert black into it when TRS or EDH errors occur. This can help overcome frame drops and repeats from unstable sources. A freeze can be also performed manually or from a GPI contact closure.

The delay value being used on the module can be accessed from the remote interface and utilized in conjunction with audio delay tracking on another module.



5450 Retiming Inputs to Production Switcher

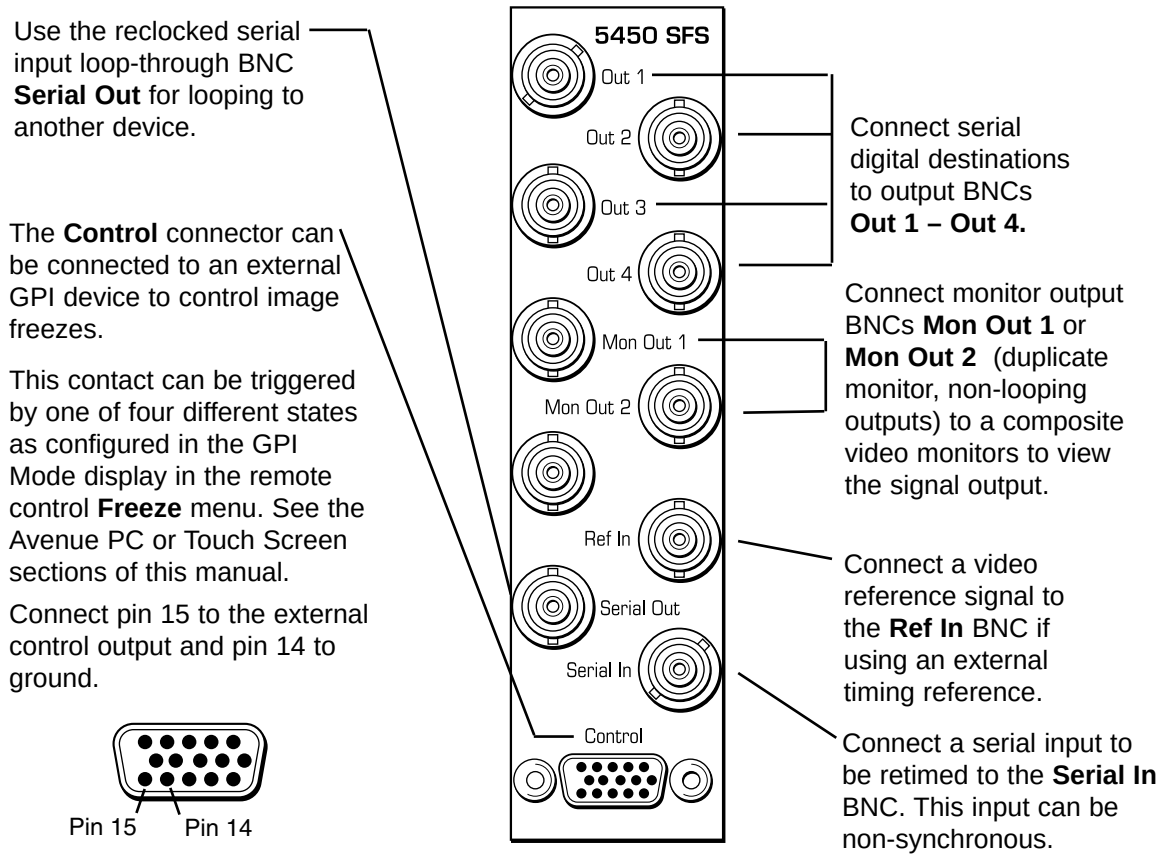
INSTALLATION

Plug the 5450 module into any one of the slots in the 1 RU or 3 RU frame and install the plastic overlay provided onto the corresponding group of rear BNC connectors associated with the module location. Note that the plastic overlay has an optional adhesive backing for securing it to the frame. Use of the adhesive backing is only necessary if you would like the location to be permanent and is not recommended if you need to change module locations. This module may be hot-swapped (inserted or removed) without powering down or disturbing performance of the other modules in the system.

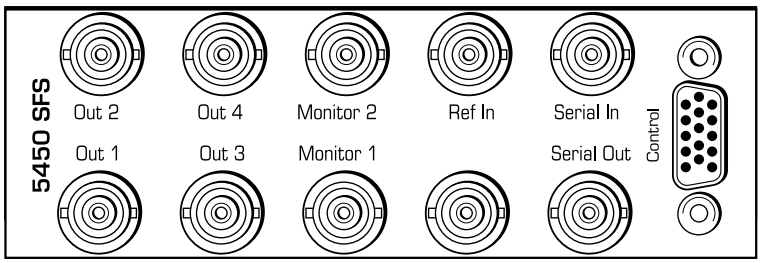
CABLING

Refer to the 3 RU and 1 RU backplane diagrams of the module below for cabling instructions. Note that unless stated otherwise, the 1 RU cabling explanations are identical to those given in the 3 RU diagram.

3 RU Backplane Diagram



1 RU Backplane Diagram



MODULE CONFIGURATION AND CONTROL

The configuration parameters for each Avenue module must be selected after installation. This can be done remotely using one of the Avenue remote control options or locally using the module front panel controls. Each module has a **REMOTE/LOCAL** switch on the front edge of the circuit board which must first be set to the control mode you will be using.

The configuration parameter choices for the module will differ between **Remote** and **Local** modes. In **Remote** mode, the choices are made through software and allow more selections. The **5450 Parameter Table** on the following page summarizes and compares the various configuration parameters that can be set remotely or locally and the default/factory settings.

If you are not using an remote control option, the module parameters must be configured from the front panel switches. Parameters that have no front panel control will be set to a default value. The **Local** switches are illustrated in the **Front Panel Controls and Indicators** section following the **5450 Parameter Table**.

Avenue module parameters can be configured and controlled remotely from one or both of the remote control options, the Avenue Touch Screen or the Avenue PC Application. Once the module parameters have been set remotely, the information is stored on the module CPU. This allows the module be moved to a different cell in the frame at your discretion without losing the stored information. Remote configuration will override whatever the switch settings are on the front edge of the module.

For setting the parameters remotely using the Avenue PC option, refer to the **Avenue PC Remote Configuration** section of this document.

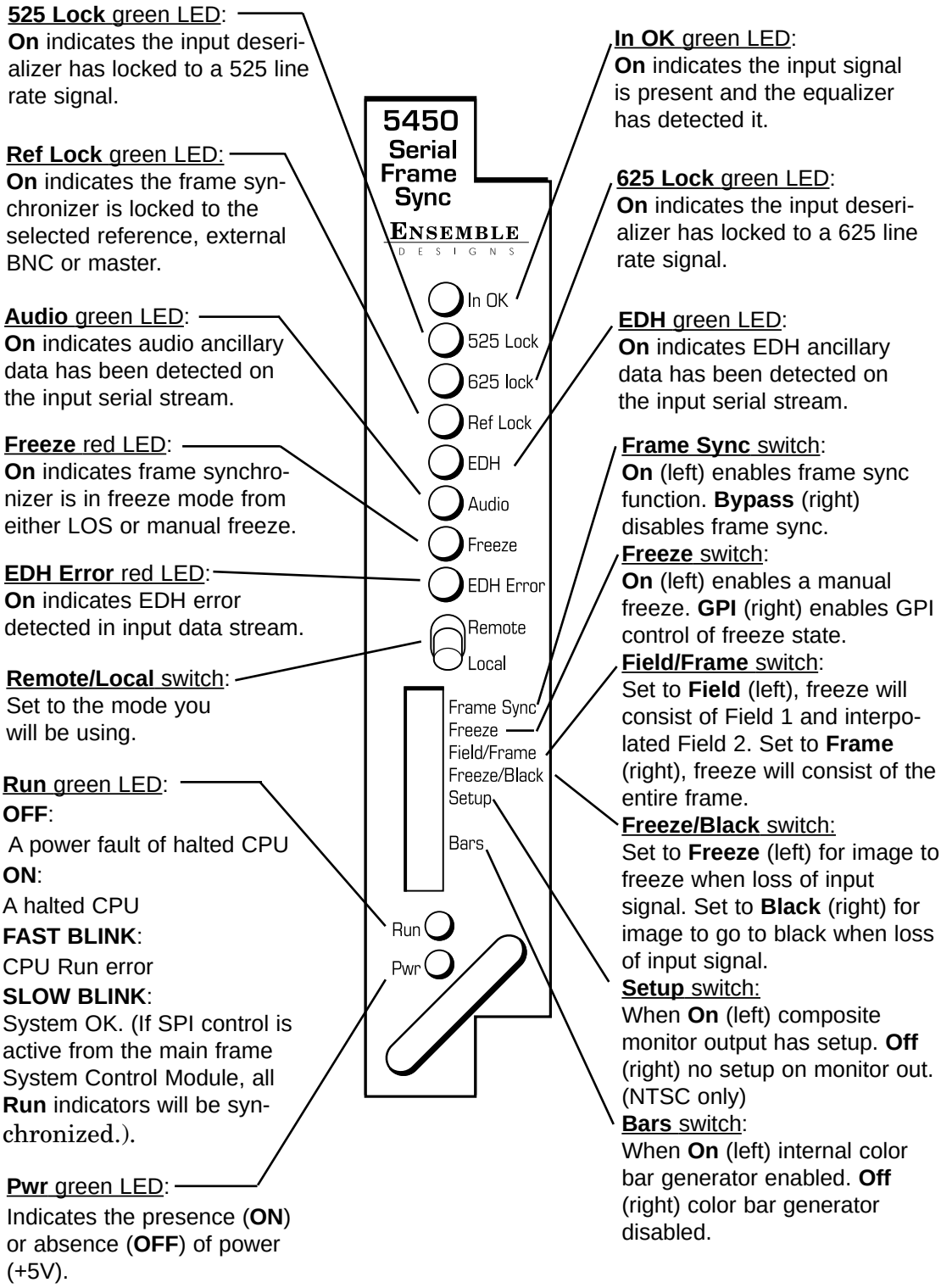
For setting the parameters remotely using the Avenue Touch Screen option, refer to the **Avenue Touch Screen Remote Configuration** section of this data pack following Avenue PC.

5450 Parameter Table

CONTROL	LOCAL	REMOTE	DEFAULT/FACTORY
Max Cable	300 meters	0 – 350 meters	300 meters
Reference Source	External Reference	External Reference Master Reference	External Reference
Frame Sync	Switch 1: On Bypass	On Bypass	On
Horizontal Time	0	±1700 Clocks	0
Vertical Time	0	±625 lines	0
Freeze (manual)	Switch 2: On GPI	On Off	N/A
Freeze Mode	Switch 3: Field1 Frame	Field1 Field2 Frame	Field1
Freeze Audio	Pass	Mute When Frz Pass When Frz	Pass
GPI Mode (Freeze)	Low	Off High Low Toggle High Toggle Low	Off
LOS Mode	Switch 4: Freeze Black	Blk on TRS Blk on TRS32 Blk on EDH FldFrz on TRS FldFrz on EDH	Blk on TRS32
LOS Audio	Pass	Pass on LOS Mute on LOS	Pass
Setup	Switch 6: On Off	On Off	On
Test Signals	Switch 7: Bars Off	Off Bars Black	Off

Front Panel Controls and Indicators

Front panel controls and indictors for the 5450 module are explained in the diagram below.



525 Lock green LED:
On indicates the input deserializer has locked to a 525 line rate signal.

Ref Lock green LED:
On indicates the frame synchronizer is locked to the selected reference, external BNC or master.

Audio green LED:
On indicates audio ancillary data has been detected on the input serial stream.

Freeze red LED:
On indicates frame synchronizer is in freeze mode from either LOS or manual freeze.

EDH Error red LED:
On indicates EDH error detected in input data stream.

Remote/Local switch:
Set to the mode you will be using.

Run green LED:
OFF:
A power fault of halted CPU
ON:
A halted CPU
FAST BLINK:
CPU Run error
SLOW BLINK:
System OK. (If SPI control is active from the main frame System Control Module, all **Run** indicators will be synchronized.).

Pwr green LED:
Indicates the presence (**ON**) or absence (**OFF**) of power (+5V).

In OK green LED:
On indicates the input signal is present and the equalizer has detected it.

625 Lock green LED:
On indicates the input deserializer has locked to a 625 line rate signal.

EDH green LED:
On indicates EDH ancillary data has been detected on the input serial stream.

Frame Sync switch:
On (left) enables frame sync function. **Bypass** (right) disables frame sync.

Freeze switch:
On (left) enables a manual freeze. **GPI** (right) enables GPI control of freeze state.

Field/Frame switch:
Set to **Field** (left), freeze will consist of Field 1 and interpolated Field 2. Set to **Frame** (right), freeze will consist of the entire frame.

Freeze/Black switch:
Set to **Freeze** (left) for image to freeze when loss of input signal. Set to **Black** (right) for image to go to black when loss of input signal.

Setup switch:
When **On** (left) composite monitor output has setup. **Off** (right) no setup on monitor out. (NTSC only)

Bars switch:
When **On** (left) internal color bar generator enabled. **Off** (right) color bar generator disabled.

Avenue PC Remote Configuration

The Avenue PC remote control menus for these modules are illustrated and explained below. Refer to the 5450 Parameter Table for a summary of available parameters that can be set remotely through the menus illustrated. For more information on using Avenue PC, refer to the Avenue PC Control Application Software data pack that came with the option.

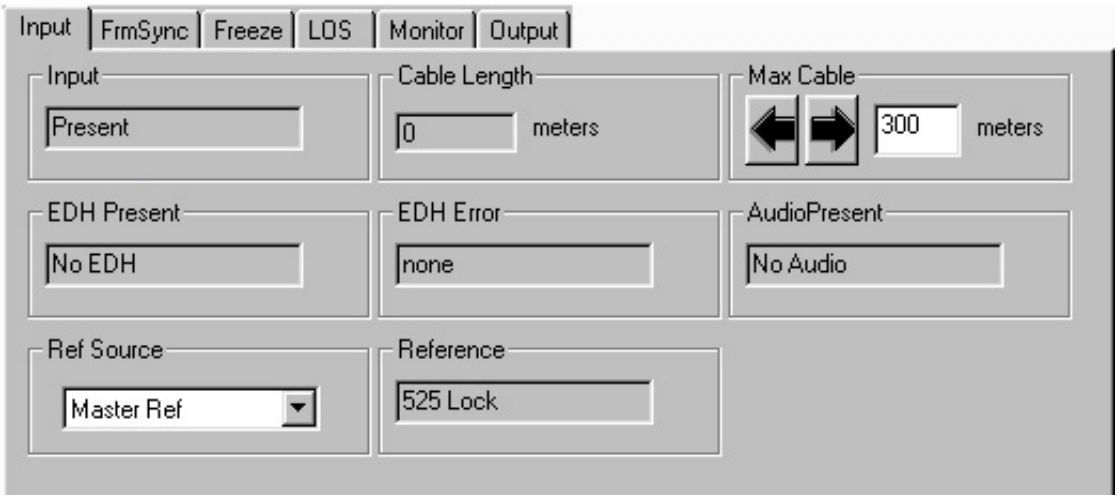
5450 Avenue PC Menus

The **Input** menu shown below allows you to set the following parameters:

- **Max Cable** – set the maximum amount of cable to be equalized.
- **Ref Source –** set the input reference to either **Master Ref** if you are using the frame reference or **External Ref** if using the external BNC.

The following displays will report module status:

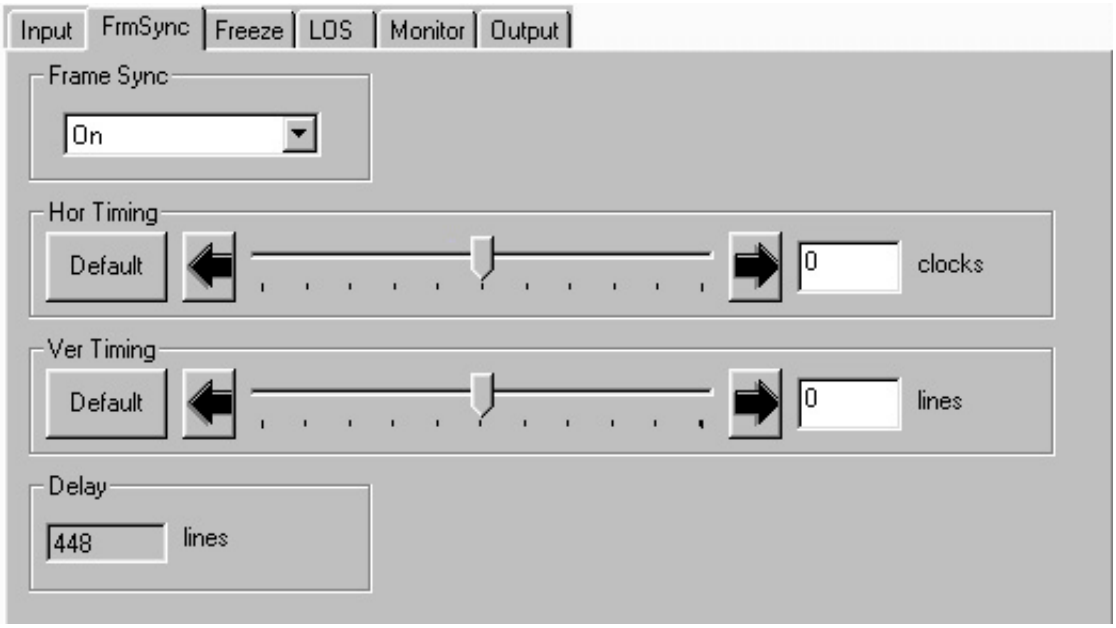
- **Input** – gives status of input signal to module.
- **Cable Length –** reports the amount of cable being equalized.
- **EDH Present** – indicates presence of ancillary EDH data in the serial data stream.
- **EDH Error** – indicates presence of EDH errors in the serial data stream.
- **Audio Present** – indicates presence of audio ancillary data in serial data stream.
- **Reference** – indicates the status of the reference as **525/625 Lock, Not Present**, **Present not locked**, or **Present bypass**.



Use the **FrmSync** menu shown below to set the following parameters:

- **Frame Sync** – turn the frame synchronizer function on or off. When on, the output stream will be timed with the selected reference signal.
- **Hor Timing –** set the amount of horizontal timing in clocks.
- **Ver Timing** – set the amount of vertical timing in lines.

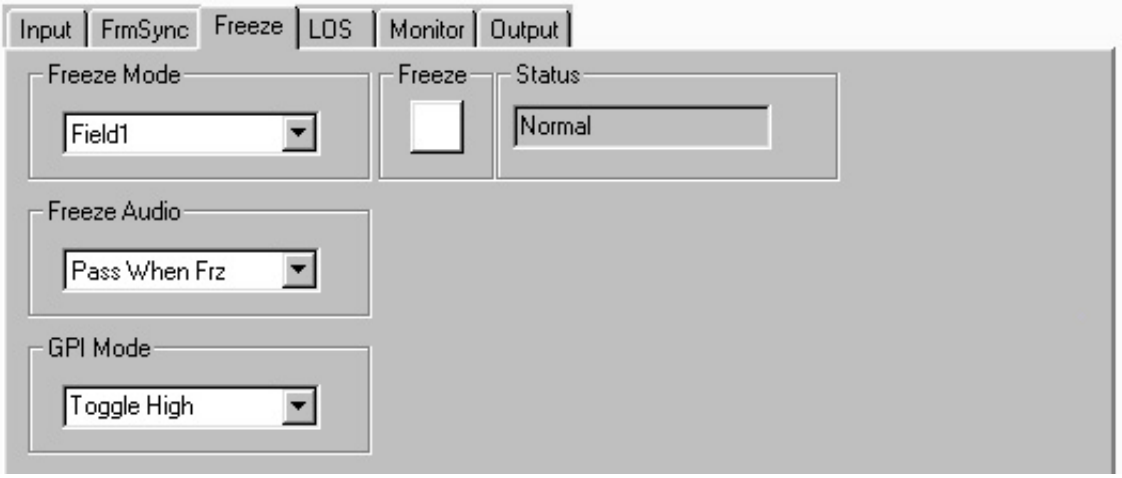
The total amount of delay through the module in lines will be reported in the **Delay** display. This value may be used in conjunction with other modules to match required delays.



The **Freeze** menu allows you to determine the freeze functions of the module as listed below:

- **Freeze** – allows an instantaneous manual freeze. When the box is checked, the contents of the frame synchronizer memory are frozen with the attributes chosen in the other freeze menu displays described below.
- **Freeze Mode** – select the type of freeze mode either **Field1**, **Field 2** or **Frame**, a freeze of the entire frame.
- **Freeze Audio** – set whether audio is passed or muted during a freeze.
- **GPI Mode** – determines the operating state of the GPI control connected to the **Control** connector on the rear of the module.
  The GPI can be configured for **High** (freeze when pin 15 high), **Low** (freeze when pin 15 low), **Toggle High** (freeze when pin 15 toggles from low to high) or **Toggle Low** (freeze when pin 15 toggles from high to low).

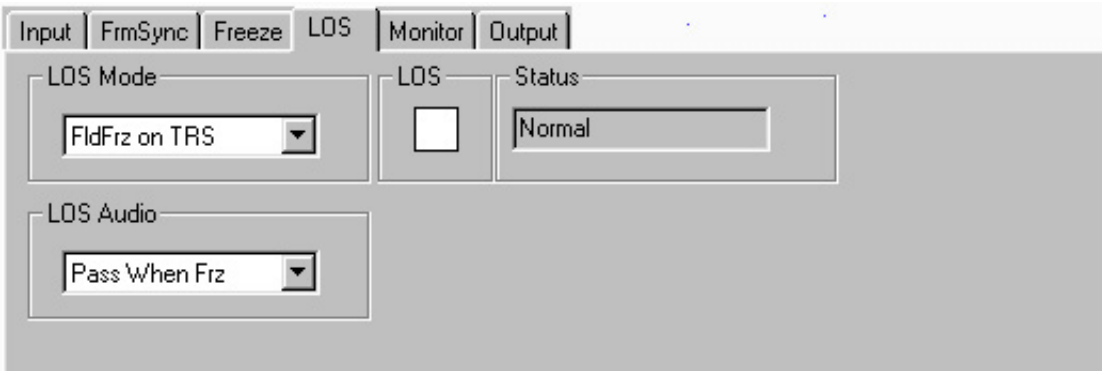
The **Status** window reports the state of the freeze state, either **Normal**, **Freeze, LOS Mute**, **LOS Black**, or **LOS Freeze**.



The **LOS** menu shown below allows you to determine the action of the module upon loss of signal. Set the following parameters from the menu:

- **LOS** – turn the loss of signal function on or off.
- **LOS Mode** – set the type of action when there is a loss of signal. You may choose to replace the signal with black on any TRS error, a TRS error that continues for 32 lines, or an EDH error. Or, you may choose to freeze the video on Field 2 when either a TRS or EDH error occurs.
- **LOS Audio** – determines the action to take on the audio channel when a loss of signal occurs.

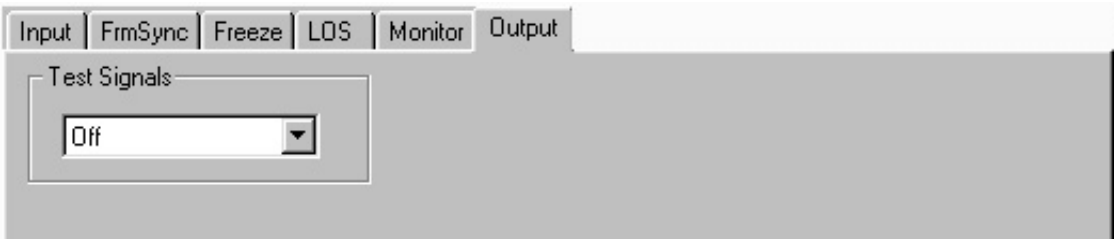
The **Status** display will report the freeze status of the module as either **Normal, Freeze**, **LOS Mute**, **LOS Black**, or **LOS Freeze**.



The **Monitor** menu below allows you to enable or disable setup on the monitor output (525 line rate only). Select the box for setup on.

The **Output** menu below allows you to set the internal test signal generator to the state listed below. The test signal passes through the frame synchronizer so the output remains in the same timing relationship as the chosen reference.

- **Off** – turns the internal test signal generator off.
- **Bars** – turns the internal color bars signal on as the module output.
- **Black** – turns the internal black test signal on as the module output.



AVENUE TOUCH SCREEN CONFIGURATION

The Avenue Touch Screen remote control menus for these modules are illustrated and explained below. Refer to the 5450 Parameter Table for a summary of available parameters that can be set remotely through the menus illustrated. For more information on using Avenue Touch Screens, refer to the Avenue Touch Screen data pack that came with the option.

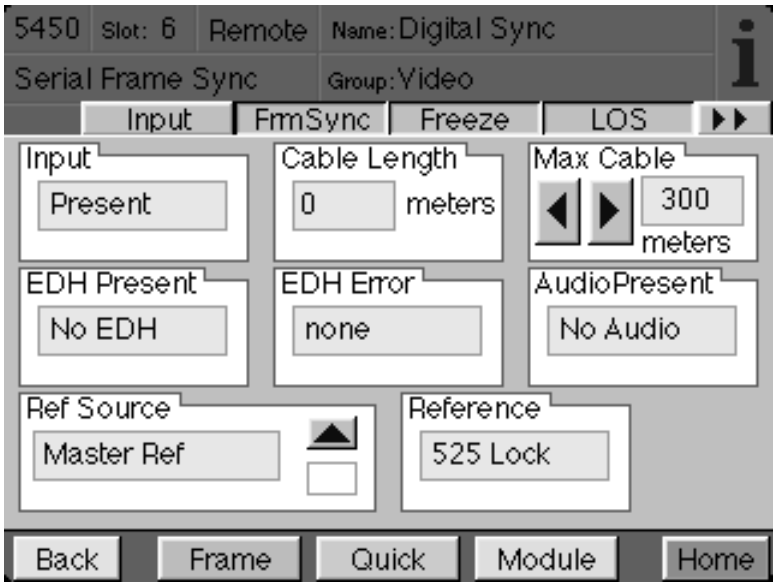
5450 Avenue Touch Screen Menus

The **Input** menu shown below allows you to set the following parameters:

- **Max Cable** – set the maximum amount of cable to be equalized.
- **Ref Source –** set the input reference to either **Master Ref** if you are using the frame reference or **Ext Ref** if using the external BNC.

The following displays will report module status:

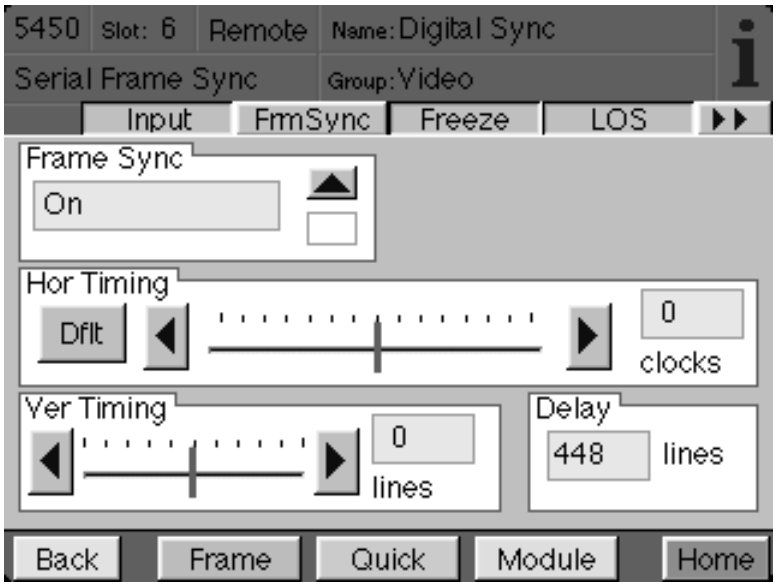
- **Input** – gives status of input signal to module.
- **Cable Length –** reports the amount of cable being equalized.
- **EDH Present** – indicates presence of ancillary EDH data in the serial data stream.
- **EDH Error** – indicates presence of EDH errors in the serial data stream.
- **Audio Present** – indicates presence of audio ancillary data in serial data stream.
- **Reference** – indicates the status of the reference as **525/625 Lock, Not Present**, **Present not locked**, or **Present bypass**.



Use the **FrmSync** menu shown below to set the following parameters:

- **Frame Sync** – turn the frame synchronizer function on or off. When on, the output stream will be timed with the selected reference signal.
- **Hor Timing –** set the amount of horizontal timing in clocks.
- **Ver Timing** – set the amount of vertical timing in lines.

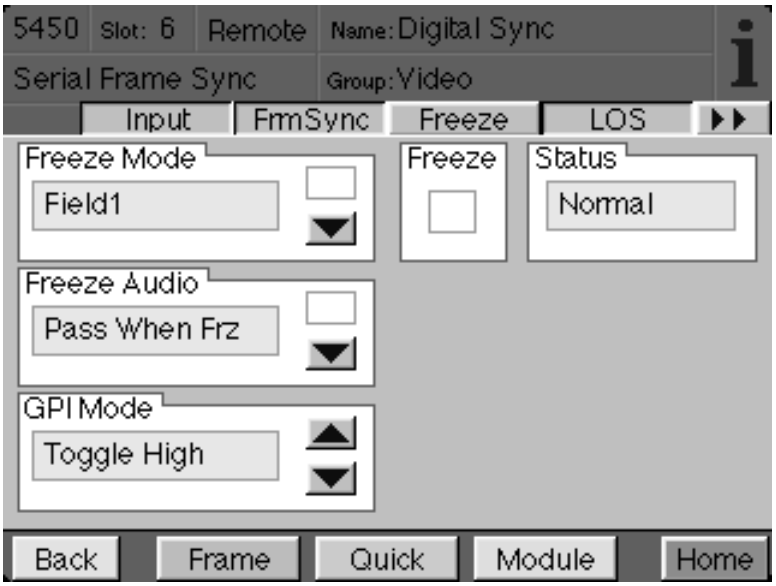
The total amount of delay through the module in lines will be reported in the **Delay** display. This value may be used in conjunction with other modules to match required delays.



The **Freeze** menu allows you to determine the freeze functions of the module as listed below:

- **Freeze** – allows an instantaneous manual freeze. When the box is checked, the contents of the frame synchronizer memory are frozen with the attributes chosen in the other freeze menu displays described below.
- **Freeze Mode** – select the type of freeze mode either **Field1**, **Field 2** or **Frame**, a freeze of the entire frame.
- **Freeze Audio** – set whether audio is passed or muted during a freeze.
- **GPI Mode** – determines the operating state of the GPI control connected to the **Control** connector on the rear of the module.
  The GPI can be configured for **High** (freeze when pin 15 high), **Low** (freeze when pin 15 low), **Toggle High** (freeze when pin 15 toggles from low to high) or **Toggle Low** (freeze when pin 15 toggles from high to low).

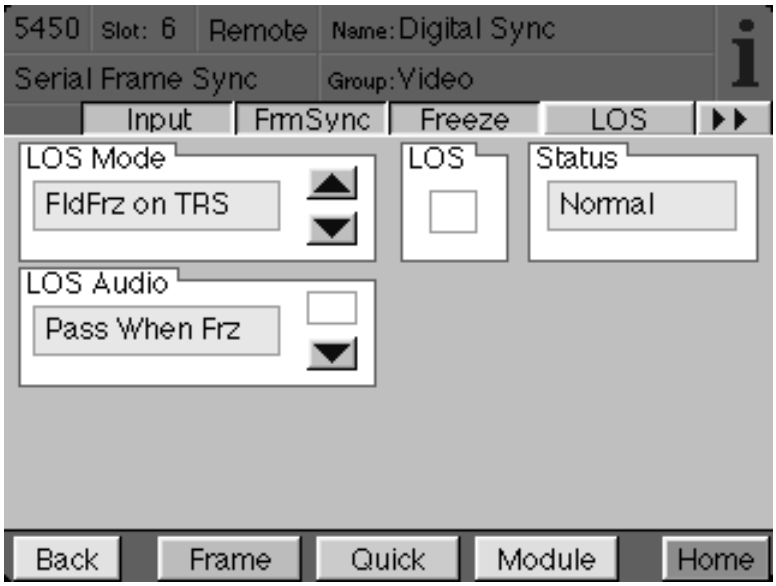
The **Status** window reports the state of the freeze state, either **Normal**, **Freeze, LOS Mute**, **LOS Black**, or **LOS Freeze**.



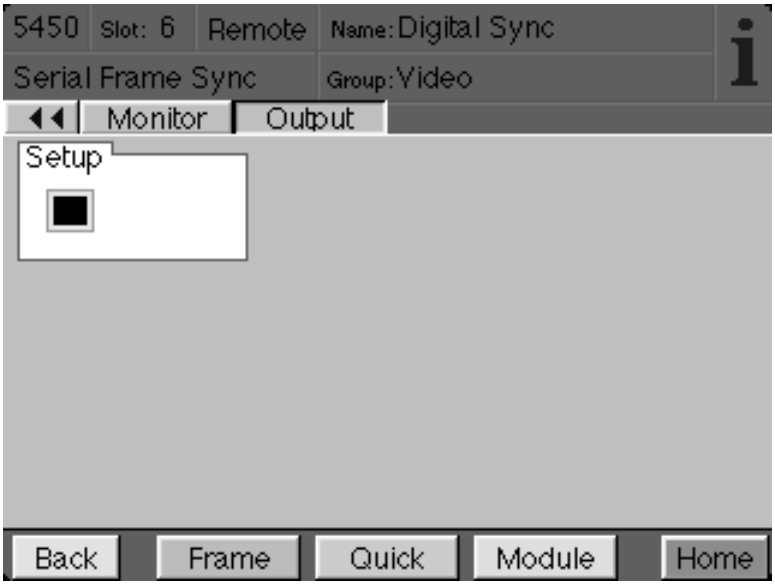
The **LOS** menu shown below allows you to determine the action of the module upon loss of sync. Set the following parameters from the menu:

- **LOS** – turn the loss of signal function on or off.
- **LOS Mode** – set the type of action when there is a loss of signal. You may choose to replace the signal with black on any TRS error, a TRS error that continues for 32 lines, or an EDH error. Or, you may choose to freeze the video on Field 2 when either a TRS or EDH error occurs.
- **LOS Audio** – determines the action to take on the audio channel when a loss of signal occurs.

The **Status** display will report the freeze status of the module as either **Normal, Freeze**, **LOS Mute**, **LOS Black**, or **LOS Freeze**.

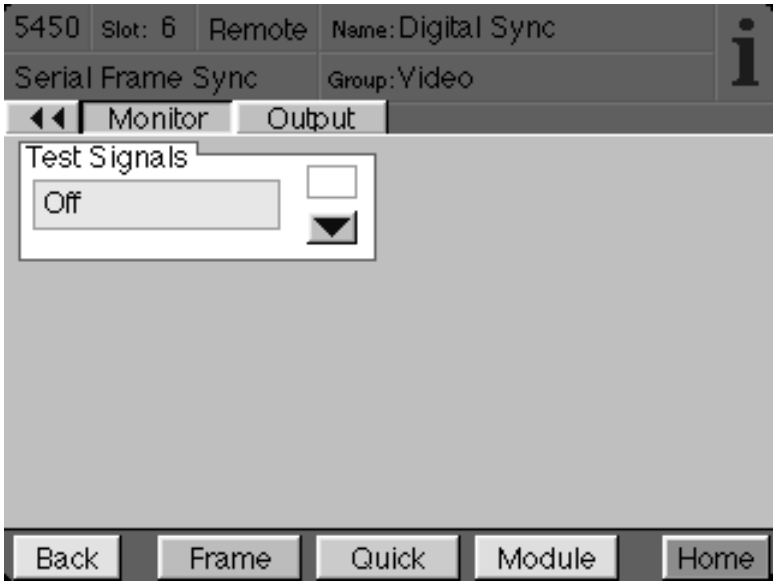


The **Monitor** menu below allows you to enable or disable setup on the monitor output (525 line rate only). Select the box for setup on.



The **Output** menu below allows you to set the internal test signal generator to the state listed below. The test signal passes through the frame synchronizer so the output remains in the same timing relationship as the chosen reference.

- **Off** – turns the internal test signal generator off.
- **Bars** – turns the internal color bars signal on as the module output.
- **Black** – turns the internal black test signal on as the module output.



TROUBLESHOOTING

As a troubleshooting aid, the input and reference signal, EDH, audio, freeze, EDH error, power and CPU status can be easily monitored from the front panel of this module using the LED indicators explained earlier.

If using the **Remote** mode, the following status items can be monitored using the Avenue Touch Screen Control Panel or PC Application:

- Input, EDH, Reference and Audio present status
- EDH error status
- Loss of signal (LOS) status
- Slot ID, Software Version and Board Revision

Refer to the overall troubleshooting tips given below for the **5450** module:

No status lights are lit on front panel:

- Check that frame power is present (green LED{s} on frame power supplies).
- Check that module is firmly seated in frame. Try removing it and plugging it in again.

Can't control module:

- Check status of CPU **Run** green LED. Should be blinking slowly and in unison with other modules if System module is present. If not, try removing it and plugging it in again.
- System module may not be working properly if installed.
- Check that the Local/Remote switch on the front of the module is set to the correct operating mode.

No signals out of module:

- Check status of In OK green LED. Should be lit. If not, check the input signal for presence and quality.
- Check for presence and locking of reference signal.
- Enable test signal from local or remote control to test signal path.
- Check cabling to input of module.
- Check remote cable equalization by switching the module to **Local** using the front panel switch.

You may also refer to the technical support section of the Ensemble or Graham-Patten web sites for the latest information on your equipment at the URLs below:

http://www.ensembledesigns.com/support

http://www.grahampatten.com

SOFTWARE UPDATING

Software upgrades for each module can be downloaded remotely if the optional System Control module is installed. These can be downloaded onto your PC and then Avenue PC will distribute the update to the individual module. (Refer to the Avenue PC documentation for more information) Periodically updates will be posted on our web site. If you do not have the required System Control Module and Avenue PC, modules can be sent back to the factory for software upgrades.

WARRANTY AND FACTORY SERVICE

Warranty

This Module is covered by a five year limited warranty, as stated in the main Preface of this manual. If you require service (under warranty or not), please contact Ensemble Designs or Graham-Patten Systems and ask for customer service before you return the unit. This will allow the service technician to provide any other suggestions for identifying the problem and recommend possible solutions.

Factory Service

If you return equipment for repair, please get a Return Material Authorization Number (RMA) from the factory first.

Ship the product and a written description of the problem to:

Ensemble Designs, Inc.
Attention: Customer Service RMA #####
870 Gold Flat Rd.
Nevada City, CA. 95959 USA
(530) 478-1830
Fax: (530) 478-1832
service@endes.com
http://www.ensembledesigns.com

Be sure to put your RMA number on the outside of the box.

OR

Graham-Patten Systems, Inc.
13366 Grass Valley Avenue
Grass Valley, CA 95945
(800) 422-6662 or (530) 273-8412
Fax: (530) 273-7458
service@gpsys.com
http://www.grahampatten.com

SPECIFICATIONS

5450 Serial Frame Synchronizer Module

Serial Input:

Number:	One
Signal Type:	Serial Digital (SMPTE 259M)
Impedance:	75 ohm
Return Loss:	
270 Mbs	>15 dB
Maximum Cable Length:	
270 Mbs	300 meters

Reference Input:

Number:	One external BNC
	One internal master timing reference from frame
Signal Type:	1V p-p nominal composite video PAL or NTSC
Impedance:	75 ohm
Return Loss:	>40 dB (applies to ext ref input)

Serial Output:

Number:	Four, re-synchronized
Signal Type:	Serial Digital (SMPTE 259M)
Impedance:	75 ohm
Return Loss:	
270 Mbs	>15 dB
Output DC:	None (AC coupled)
Delay:	20 clocks in bypass
	600 clocks minimum
	1 frame maximum
Delay Resolution:	1 clock, 74 nsec

Serial Loop Thru Output:

Number:	One, reclocked
Signal Type:	Serial Digital (SMPTE 259M)
Impedance:	75 ohm
Return Loss:	
270 Mbs	>15 dB
Output DC:	None (AC coupled)
Delay:	<10 clocks

Composite Monitor Output:

Number:	Two
Signal Type:	PAL or NTSC
Impedance:	75 ohm
Return Loss:	>40 dB (applies to ext ref input)
Output DC:	< ±200 mV
Frequency Response:	±2.5 dB, 10 kHz to 5.0 MHz
KFactors:	<1.5%
D to A Resolution:	8-bit, 2x oversampled

General Specifications:

Power Consumption:	< 9.6 watts
Temperature Range:	0 to 50 degrees C ambient (all specs met)
Relative Humidity:	0 to 95% noncondensing
Altitude:	0 to 10,000 ft
Fusing:	1.5 Amp PTC resettable fuse

Due to ongoing product development, all specifications subject to change.